Regarding the invention being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.

We claim:

1. A method for analysis of variables operable to transform an input variable into an output variable having mathematical properties of a scalar field comprising the following steps:

   (a) applying a Threshold Filter to a difference of a Displacement Variable and an input variable producing a first scalar field of said Displacement Variable; and

   (b) filtering said first scalar field of step (a) with a first Averaging Filter operable to perform time averaging of said first scalar field and operable to perform spatial averaging of said first scalar field producing a second scalar field of said Displacement Variable.

2. A method for analysis of variables operable to transform an input variable into an output variable as recited in claim **1** further comprising the step:

   modulating said first scalar field of step (a) by a Modulating Variable producing a modulated first scalar field of said Displacement Variable.

3. A method for analysis of variables as recited in claim **2** wherein said Threshold Filter is a Probe and said Modulating Variable is a norm of a first time derivative of the input variable, and where said modulated first scalar field is a Counting Rate.

4. A method for analysis of variables as recited in claim **3** wherein the input variable further comprises a vector combining the components of the input variable and first time derivatives of said components of the input variable.

5. A method for analysis of variables as recited in claim **2** further comprising the step:

dividing said second scalar field of step (b) by said Modulating Variable where said Modulating Variable has been first filtered with a second Averaging Filter where said second Averaging Filter has an impulse response identical to the impulse response of said first Averaging Filter.

6. A method for analysis of variables as recited in claim **5** wherein said Threshold Filter is a Probe and said Modulating Variable is a norm of a first time derivative of the input variable, and where said second scalar field of step (b) is a Counting Density.

7. A method for analysis of variables as recited in claim **6** wherein the input variable further comprises a vector combining the components of the input variable and first time derivatives of said components of the input variable.

8. A method for analysis of variables as recited in claim **5** wherein said Threshold Filter is a Discriminator and said Modulating Variable is a norm of a first time derivative of the input variable, and where said second scalar field of step (b) is a Cumulative Counting Distribution.

9. A method for analysis of variables as recited in claim **8** wherein the input variable further comprises a vector combining the components of the input variable and first time derivatives of said components of the input variable.

10. A method for analysis of variables as recited in claim **5** wherein said Threshold Filter is a first Probe and where said second scalar field of step (b) is a Modulated Threshold Density.

11. A method for analysis of variables as recited in claim **10** wherein the input variable further comprises a vector combining the components of the input variable and first time derivatives of said components of the input variable.

12. A method for analysis of variables as recited in claim **10** further comprising the following steps:

(a) applying a second Probe to a difference between a feedback of a Quantile Density variable and said Modulated Threshold Density producing a first function of said Quantile Density variable;

(b) multiplying said first function of Quantile Density of step (a) by said Modulated Threshold Density producing a first modulated function of Quantile Density;

(c) filtering said first modulated function of Quantile Density of step (b) with a first Time Averaging Filter producing a first time averaged modulated function of Quantile Density;

(d) integrating said first time averaged modulated function of step (c) over the values of said Displacement Variable producing a first threshold integrated function of Quantile Density;

(e) applying a first Discriminator to the difference between the feedback of said Quantile Density variable and said Modulated Threshold Density variable wherein said first Discriminator is a respective discriminator of said second Probe producing a second function of said Quantile Density variable;

(f) subtracting a quantile value and said second function of Quantile Density of step (g) from a unity and multiplying the difference by said Modulated Threshold Density producing a second modulated function of Quantile Density;

(g) filtering said second modulated function of Quantile Density of step (f) with a second Time Averaging Filter wherein the impulse response of said second Time Averaging Filter is a first derivative of the impulse response of said first Time Averaging Filter producing a second time averaged modulated function of Quantile Density;

(h) integrating said second averaged modulated function of step (g) over the values of said Displacement Variable producing a second threshold integrated function of Quantile Density; and

(i) dividing said second threshold integrated function of step (h) by said first threshold integrated function of step (d) and time-integrating the quotient to output said Quantile Density variable.

13. A method for analysis of variables as recited in claim **12** further comprising the step:

applying a second Discriminator to the difference of said Modulated Threshold Density and said Quantile Density variable to output a Quantile Domain Factor variable.

09254524.080304

14. A method for analysis of variables as recited in claim **13** further comprising the step:

integrating said Quantile Domain Factor variable over the values of said Displacement Variable to output a Quantile Volume variable.

15. A method for analysis of variables as recited in claim **5** wherein said Threshold Filter is a Discriminator and where said second scalar field of step (b) is a Modulated Cumulative Threshold Distribution.

16. A method for analysis of variables as recited in claim **15** wherein the input variable further comprises a vector combining the components of the input variable and first time derivatives of said components of the input variable.

17. A method for analysis of variables as recited in claim **1** wherein said Threshold Filter is a first Probe and where said second scalar field of step (b) is an Amplitude Density.

18. A method for analysis of variables as recited in claim **17** wherein the input variable further comprises a vector combining the components of the input variable and first time derivatives of said components of the input variable.

19. A method for analysis of variables as recited in claim **17** further comprising the following steps:

(a) applying a second Probe to a difference between a feedback of a Quantile Density variable and said Amplitude Density producing a first function of said Quantile Density variable;

(b) multiplying said first function of Quantile Density of step (a) by said Amplitude Density producing a first modulated function of Quantile Density;

(c) filtering said first modulated function of Quantile Density of step (b) with a first Time Averaging Filter producing a first time averaged modulated function of Quantile Density;

(d) integrating said first time averaged modulated function of step (c) over the values of said Displacement Variable producing a first threshold integrated function of Quantile Density;

(e) applying a first Discriminator to the difference between the feedback of said Quantile Density variable and said Amplitude Density wherein said first Discriminator is a respective discriminator of said second Probe producing a second function of said Quantile Density variable;

(f) subtracting a quantile value and said second function of Quantile Density of step (e) from a unity and multiplying the difference by said Amplitude Density producing a second modulated function of Quantile Density;

(g) filtering said second modulated function of Quantile Density of step (f) with a second Time Averaging Filter wherein the impulse response of said second Time Averaging Filter is a first derivative of the impulse response of said first Time Averaging Filter producing a second time averaged modulated function of Quantile Density;

(h) integrating said second time averaged modulated function of step (g) over the values of said Displacement Variable producing a second threshold integrated function of Quantile Density; and

(i) dividing said second threshold integrated function of step (h) by said first threshold integrated function of step (d) and time-integrating the quotient to output said Quantile Density variable.

20. A method for analysis of variables as recited in claim **19** further comprising the step:

applying a second Discriminator to the difference of said Amplitude Density and said Quantile Density variable to output a Quantile Domain Factor variable.

21. A method for analysis of variables as recited in claim **20** further comprising the step:

integrating said Quantile Domain Factor variable over the values of said Displacement Variable to output a Quantile Volume variable.

22. A method for analysis of variables as recited in claim **1** wherein said Threshold Filter is a Discriminator and where said second scalar field of step (b) is a Cumulative Amplitude Distribution.

23. A method for analysis of variables as recited in claim **22** wherein the input variable further comprises a vector combining the components of the input variable and first time derivatives of said components of the input variable.

24. A method for Rank Normalization of an input variable with respect to a reference variable comprising the following steps:

(a) applying a Discriminator to a difference of a Displacement Variable and a reference variable producing a first scalar field of said Displacement Variable;

(b) filtering said first scalar field of step (a) with a first Averaging Filter operable to perform time averaging of said first scalar field and operable to perform spatial averaging of said first scalar field producing a second scalar field of said Displacement Variable;

(c) applying a Probe to a difference of said Displacement Variable and an input variable producing a third scalar field of said Displacement Variable; and

(d) multiplying said third scalar field of step (c) by said second scalar field of step (b) and integrating the product over the values of said Displacement Variable to output a Rank Normalized variable.

25. A method for Rank Normalization of an input variable with respect to a reference variable as recited in claim **24** wherein the reference variable is identical to the input variable.

26. A method for Rank Normalization of an input variable with respect to a reference variable as recited in claim **24** further comprising the following steps:

(a) modulating said first scalar field of step (a) by a Modulating Variable; and

(b) dividing said second scalar field variable of step (b) by said Modulating Variable where said Modulating Variable has been first filtered with a second Averaging Filter where said second Averaging Filter has an impulse response identical to the impulse response of said first Averaging Filter.

27. A method for Rank Normalization of an input variable with respect to a reference variable as recited in claim **26** wherein the reference variable is identical to the input variable.

28. A method for analysis of variables operable to transform an input variable into an output Mean at Reference Threshold variable comprising the following steps:

(a) applying a Probe to a difference of a Displacement Variable and a reference variable producing a first scalar field of said Displacement Variable;

(b) modulating said first scalar field of step (a) by an input variable producing a modulated first scalar field of said Displacement Variable;

(c) filtering said modulated first scalar field of step (b) with a first Averaging Filter operable to perform time averaging of said modulated first scalar field and operable to perform spatial averaging of said modulated first scalar field producing a second scalar field of said Displacement Variable; and

(d) dividing said second scalar field of step (c) by said first scalar field of step (a) where said first scalar field has been first filtered with a second Averaging Filter where said second Averaging Filter has an impulse response identical to the impulse response of said first Averaging Filter producing a Mean at Reference Threshold variable.

29. A method for analysis of variables operable to transform an input scalar field variable into an output Rank Filtered variable comprising the following steps:

(a) applying a first Probe to a difference of a Displacement Variable and an input variable producing a first scalar function of said Displacement Variable;

(b) filtering said first scalar function of step (a) with a first Averaging Filter operable to perform time averaging of said first scalar function and operable to perform spatial averaging of said first scalar function producing a first averaged scalar function of said Displacement Variable;

(c) applying a Discriminator to the difference of said Displacement Variable and the input variable wherein said Discriminator is a respective discriminator of said first Probe producing a second scalar function of said Displacement Variable;

EL388608922US

(d) filtering said second scalar function of step (c) with a second Averaging Filter where said second Averaging Filter has an impulse response identical to the impulse response of said first Averaging Filter producing a second averaged scalar function of said Displacement Variable;

(e) applying a second Probe to a difference of a quantile value and said second averaged scalar function of step (d) wherein the width parameter of said second Probe is substantially smaller than unity producing an output of the second Probe; and

(f) multiplying said output of the second Probe of step (e) by said first averaged scalar function of step (b) and by said Displacement Variable and integrating the product over the values of said Displacement Variable to output said Rank Filtered variable.

30. A method for analysis of variables operable to transform an input scalar field variable into an output Rank Filtered variable as recited in claim **29** wherein said first scalar function of step (a) and said second scalar function of step (c) are modulated by a Modulating Variable further comprising the step:

dividing said first averaged scalar function of step (b) and said second averaged scalar function of step (d) by said Modulating Variable where said Modulating Variable has been first filtered with a third Averaging Filter where said third Averaging Filter has an impulse response identical to the impulse response of said first Averaging Filter and to the impulse response of said second Averaging Filter.

31. A method for analysis of variables as recited in claim **30** wherein said Modulating Variable is an absolute value of a first time derivative of the input variable.

32. A method for Rank Filtering operable to transform an input scalar variable into an output Rank Filtered variable comprising the following steps:

(a) applying a Probe to a difference between a feedback of a Rank Filtered variable and an input variable producing a first scalar function of said Rank Filtered variable;

4052454.080301

(b) filtering said first scalar function of step (a) with a first Time Averaging Filter operable to perform time averaging of said first scalar function producing a first averaged scalar function of said Rank Filtered variable;

(c) applying a Discriminator to the difference between the feedback of said Rank Filtered variable and the input variable wherein said Discriminator is a respective discriminator of said Probe producing a second scalar function of said Rank Filtered variable;

(d) subtracting said second scalar function of step (c) from a quantile value and filtering the difference with a second Time Averaging Filter wherein the impulse response of said second Time Averaging Filter is a first derivative of the impulse response of said first Time Averaging Filter producing a second averaged scalar function of said Rank Filtered variable; and

(e) dividing said second averaged scalar function of step (d) by said first averaged scalar function of step (b) and time-integrating the quotient to output said Rank Filtered variable.

09621524 . 030301

33. A method for analysis of variables as recited in claim **32** wherein said first scalar function of step (a) is modulated by a Modulating Variable and where the difference between said quantile value and said second scalar function of step (c) is modulated by said Modulating Variable.

34. A method for analysis of variables as recited in claim **33** wherein said Modulating Variable is an absolute value of a first time derivative of the input variable.

35. A method for analysis of variables as recited in claim **34** wherein the width parameter of said Discriminator and the respective Probe is indicative of variability of said Rank Filtered variable.

36. A method for analysis of variables as recited in claim **32** wherein the width parameter of said Discriminator and the respective Probe is indicative of variability of said Rank Filtered variable.

37. A method for analysis of variables as recited in claim **33** wherein the width parameter of said Discriminator and the respective Probe is indicative of variability of said Rank Filtered variable.

38. A method for analysis of variables as recited in claim **32** wherein said input scalar variable is an input scalar field variable, and wherein filtering said first averaged scalar function in step (b) to produce said first averaged scalar function includes filtering with a first Spatial Averaging Filter operable on the spatial coordinates of the input variable, and wherein filtering said second averaged scalar function in step (d) to produce said second averaged scalar function includes filtering with a second Spatial Averaging Filter operable on the spatial coordinates of the input variable where said second Spatial Averaging Filter has an impulse response identical to the impulse response of said first Spatial Averaging Filter.

39. A method for analysis of variables as recited in claim **38** wherein the width parameter of said Discriminator and the respective Probe is indicative of variability of said Rank Filtered variable.

40. A method for analysis of variables as recited in claim **32** wherein said input scalar variable is an input scalar field variable, and wherein said first scalar function of step (a) is modulated by a Modulating Variable, and wherein the difference between said quantile value and said second scalar function of step (c) is modulated by said Modulating Variable, and wherein filtering said first averaged scalar function in step (b) to produce said first averaged scalar function includes filtering with a first Spatial Averaging Filter operable on the spatial coordinates of the input variable and on the spatial coordinates of said Modulating Variable, and wherein filtering said second averaged scalar function in step (d) to produce said second averaged scalar function includes filtering with a second Spatial Averaging Filter operable on the spatial coordinates of the input variable and on the spatial coordinates of said Modulating Variable where said second Spatial Averaging Filter has an impulse response identical to the impulse response of said first Spatial Averaging Filter.

EL388608922US

41. A method for analysis of variables as recited in claim **40** wherein said Modulating Variable is an absolute value of a first time derivative of the input variable.

42. A method for analysis of variables as recited in claim **41** wherein the width parameter of said Discriminator and the respective Probe is indicative of variability of said Rank Filtered variable.

43. A method for analysis of variables as recited in claim **40** wherein the width parameter of said Discriminator and the respective Probe is indicative of variability of said Rank Filtered variable.

44. A method for Rank Filtering transforming an ensemble of input scalar variables into an output Rank Filtered variable comprising the following steps:

(a) applying a Probe to each difference between a feedback of a Rank Filtered variable and each component of an ensemble of input variables producing a first ensemble of scalar functions of said Rank Filtered variable;

(b) multiplying each component of said first ensemble of scalar functions of step (a) by the weight of the respective component of the ensemble of input variables and summing the products producing a first scalar function of said Rank Filtered variable;

(c) filtering said first scalar function of step (b) with a first Time Averaging Filter producing a first averaged scalar function of said Rank Filtered variable;

(d) applying a Discriminator to each difference between the feedback of said Rank Filtered variable and each component of the ensemble of input variables wherein said Discriminator is a respective discriminator of said Probe producing a second ensemble of scalar functions of said Rank Filtered variable;

(e) multiplying each difference between a quantile value and each component of said second ensemble of scalar functions of step (d) by the weight of the respective component of the ensemble of input variables and summing the products producing a second scalar function of said Rank Filtered variable;

(f) filtering said second scalar function of step (e) with a second Time Averaging Filter wherein the impulse response of said second Time Averaging Filter is a first derivative of the impulse response of said first Time Averaging Filter producing a second averaged scalar function of said Rank Filtered variable; and

(g) dividing said second averaged scalar function of step (f) by said first averaged scalar function of step (c) and time-integrating the quotient to output said Rank Filtered variable.

45. A method for analysis of variables as recited in claim **44** wherein step (a) of applying said Probe to each difference further comprises modulating said first ensemble of scalar functions by an ensemble of Modulating Variables, and wherein multiplying each difference in step (e) further comprises modulating said products by the respective components of said ensemble of Modulating Variables, and wherein the summing in step (e) is summing the modulated products.

46. A method for analysis of variables as recited in claim **45** wherein the components of said ensemble of Modulating Variables are absolute values of first time derivatives of the respective components of the ensemble of input variables.

47. A method for analysis of variables as recited in claim **46** wherein the width parameter of said Discriminator and the respective Probe is indicative of variability of said Rank Filtered variable.

48. A method for analysis of variables as recited in claim **45** wherein the width parameter of said Discriminator and the respective Probe is indicative of variability of said Rank Filtered variable.

49. A method for analysis of variables as recited in claim **44** wherein the width parameter of said Discriminator and the respective Probe is indicative of variability of said Rank Filtered variable.

50. A method for Rank Selecting operable to transform a scalar field input variable into a scalar field output variable comprising the following steps:

(a) applying a Probe to a difference between a feedback of an output variable and an input variable producing a first scalar function of the output variable;

(b) filtering said first scalar function of step (a) with a Time Averaging Filter having an exponentially forgetting impulse response and a first Spatial Averaging Filter operable on the spatial coordinates of the input variable producing a first averaged scalar function of the output variable;

(c) applying a Discriminator to the difference between the feedback of the output variable and the input variable wherein said Discriminator is a respective discriminator of said Probe producing a second scalar function of the output variable;

(d) filtering the difference between a quantile value and said second scalar function of step (c) with a second Spatial Averaging Filter operable on the spatial coordinates of the input variable where said second Spatial Averaging Filter has an impulse response identical to the impulse response of said first Spatial Averaging Filter producing a second averaged scalar function of the output variable; and

(e) dividing said second averaged scalar function of step (d) by said first averaged scalar function of step (b) and by the time constant of the impulse response of said Time Averaging Filter and time-integrating the quotient to produce said scalar field output variable.

51. A method for Rank Selecting operable to transform an ensemble of input scalar variables into an output scalar variable comprising the following steps:

(a) applying a Probe to each difference between a feedback of an output scalar variable and each component of an ensemble of input variables producing a first ensemble of scalar functions of the output variable;

(b) multiplying each component of said first ensemble of scalar functions of step (a) by the weight of the respective component of the ensemble of input variables and summing the products producing a first scalar function of the output variable;

EL388608922US

(c) filtering said first scalar function of step (b) by a Time Averaging Filter having an exponentially forgetting impulse response producing a first averaged scalar function of the output variable;

(d) applying a Discriminator to each difference between the feedback of the output variable and each component of the ensemble of input variables wherein said Discriminator is a respective discriminator of said Probe producing a second ensemble of scalar functions of the output variable;

(e) multiplying each difference between a quantile value and each component of said second ensemble of scalar functions of step (d) by the weight of the respective component of the ensemble of input variables and summing the products producing a second scalar function of the output variable; and

(f) dividing said second scalar function of step (e) by said first averaged scalar function of step (c) and by the time constant of the impulse response of said Time Averaging Filter and time-integrating the quotient to produce the output variable.

52. A method for Rank Normalization of an input variable with respect to a reference variable comprising the following steps:

(a) determining a measure of central tendency of an Amplitude Density of a reference variable;

(b) determining a measure of variability of said Amplitude Density of the reference variable; and

(c) applying a Discriminator to a difference of said measure of central tendency and the input variable wherein the width parameter of said Discriminator is indicative of said measure of variability.

53. A method for Rank Normalization of an input variable with respect to a reference variable as recited in claim **52** wherein the reference variable is identical to the input variable.

54. A method for Rank Normalization of an input variable with respect to a reference variable comprising the following steps:

(a) determining a measure of central tendency of a Modulated Threshold Density of a reference variable;

(b) determining a measure of variability of said Modulated Threshold Density of the reference variable; and

(c) applying a Discriminator to a difference of said measure of central tendency and the input variable wherein the width parameter of said Discriminator is indicative of said measure of variability.

55. A method for Rank Normalization of an input variable with respect to a reference variable as recited in claim **54** wherein the reference variable is identical to the input variable.

09521524.080301